IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of: James R. Allen
Serial Number: 10/629,153 Art Unit: 3641
Filed: July 29, 2003 Examiner: M. Thompson
For: Environmentally Safe Substitute For Lead Shot

Remarks

Claims 1-3 remain in the application. Claims 4-16 have been cancelled. Claims 1-3 stand rejected. Claim 1 has been amended to indicate that the inner core and outer covering are non-toxic. The claim has also been amended to make the comparisons of lubricity, hardness and density to that of a lead shot pellet of the same size as the claimed shot pellet, rather than the ubiquitous term "lead". Applicant has further modified that comparison by indicating that the parameters of lubricity, hardness and density are approximately equal to that of lead shot pellets. Bases for these amendments areas are follows. The entire subject of the application deals with a non-toxic substitute for lead that has approximately the same characteristics as a lead shot pellet of the same size.

Claim 4, dealing with the nickel coating has also been canceled.

The specification has been amended to include reference to a new drawing figure as required by the examiner. Both the new figure and description show and describe the basic structure described in the claims. No new matter has been added.

The Rejections

The examiner has rejected claims 1-4 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The examiner states that the

claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is not clear to the examiner what quantities and percentages of the disclosed compositions yield the claimed shot pellet comprising the claimed properties.

The examiner has rejected claim 1 under 35 U.S.C. 102(b) as being clearly anticipate by Kreuzer (US Patent # 3,120,188). Kreuzer discloses a shot pellet comprising a multilayered annular metallic composite having an inner core, having a density and an outer shell (Figure 2), whereby said shot pellet has an outer surface having a hardness and a lubricity equal to that of lead and farther whereby the shot pellet also has a density equal to lead (since it is lead then it must have these exact same properties equal to that of lead).

The examiner has rejected claims 1-3 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Oltrogge (US Patent # 5,279,787). Oltrogge discloses a shot pellet comprising a multilayered annular metallic composite having an inner core, having a density and an outer shell, the inner core is formed of tungsten, the outer shell is formed of bismuth and tin; the shot pellet has a density equal to lead (Table I). Although Oltrogge does not expressly disclose the outer surface having a hardness and a lubricity equal to that of lead, it is inherent that it

would have the same properties as applicant's disclosed pellet since Oltrogge discloses the same elements, structure and product as applicant.

The examiner has rejected claim claims 1 and 4 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hooper et al. (US Patent # 4,881,465). Hooper et al. discloses a shot pellet comprising a multilayered annular metallic composite having an inner core, an outer shell, and a layer of nickel formed over the inner core (column 4, lines 25-35). The pellet having a density equal to lead (column 3, lines 45-55). Although Hooper et al. does not expressly disclose the outer surface having a hardness and a lubricity equal to that of lead, it is inherent that the outer surface would have a hardness and a lubricity approximately equal to that of lead (similar to that as disclosed by applicant), since the hardness of the individual elements are approximately equal to that of lead.

Response

The applicant believes that all of the rejections and objections have been resolved. Regarding the section 112 rejections, applicant has amended claim 1 to indicate that the claimed shot pellets have *approximately* the same characteristics as lead shot pellets of the same size.

Regarding the ability to make the invention without undue experimentation, the shot, as now claimed, has approximately the characteristics of lead. It can be made

following the method taught in the specification. Since the high density tungsten is fully encapsulated in an outer shell of tin/bismuth, and since that outer shell has approximately the same lubricity and hardness of lead, there is no change in outer shell composition required to be made with varying densities. Indeed, since the thickness of the outer shell compared to the inner core can be controlled, it is only a matter of controlling the ratio of outer shell thickness to inner core diameter, or in the alternative, varying the absolute density of the tungsten carrier while maintaining the same ratio of inner core to outer annulus to control the density. Such calculations are described in the specification and are well within the skills of an ordinary practitioner on the art.

The statement by the examiner that: " [i]t is not clear to the examiner how one measures the lubricity of the elements to determine whether they are equal to lead and applicant has not disclosed anything concerning the lubricity besides stating that it is a desired quality. .." is addressed in two ways. First, the claims have been amended to indicate that lubricity is now approximately equal to lead. Second, lubricity for various materials is found in published tables that are well known in the art. It is a simple matter to look up the lubricity of lead and then find other materials with a similar lubricity.

Regarding the examiner's statement that it is not clear to the examiner where the layer of nickel is located and how it affects the claimed properties. Applicants have canceled claim 4; consequently, this issue is moot.

Thus, the process described in the specification is well within the skill level of someone of ordinary skill in the art to produce a shot pellet with the *approximate* characteristics of lead.

The Section 102 Rejections

As described above, the examiner has rejected claim 1 under 35 U.S.C. 102(b) as being clearly anticipate by Kreuzer (US Patent # 3,120,188). Kreuzer discloses a method of applying a lead coating to a lead ball by tumbling the balls in a lead powder. Inasmuch as claim 1 has been amended to clarify that the shot in the instant invention is made of non-toxic materials, applicants believe that the Kreuzer reference is no longer relevant. Accordingly, this rejection has been traversed.

Regarding the rejection of claims 1-3 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Oltrogge (US Patent # 5,279,787). A review of Oltrogge, however, reveals that the shot produced by the Oltrogge method is not the shot described in the instant claims. As claimed herein, the shot pellets have: a multilayered annular metallic composite; having a non-toxic inner core, and a non-toxic outer shell. Oltrogge teaches a composite material that has a

uniform composition that lacks the inner core and the outer shell. Oltrogge achieves this by melting low melting-point material and then blending it with high melting point the materials. As such, it is impossible in the Oltrogge method to produce a pellet that has a distinct inner core and a distinct outer shell. (Note that the jacketed bullets shown in Oltrogge are not shot pellets and cannot be construed as such because Oltrogge also shows shot pellets made with his method).

Oltrogge states:

> Referring in more detail to the drawings, FIG. 1 illustrates the sequence of steps followed in the manufacture of high density metal products.... FIG. 1, step 1 illustrates the melting of a mixture of low melting point metals to a temperature above the liquidus line of the *alloy*....Once the matrix alloy is melted in accordance with the present invention, a high density high melting point metal powder is introduced in proportions by weight to the alloy so as to result in an end product having the target density. *The high melting point metal is introduced in powdered form of the desired size or consistency and uniformly distributed by vigorously stirring without melting into the alloy,* followed by forming into a droplet shape, as represented in step 3. (Oltrogge col. 4, lines 15-41) (Emphasis added)

Oltrogge talks specifically about shot pellets at col. 6, lines 52-63:

> FIG. 7 illustrates a spherical shot pellet 40 composed entirely of the core material 22 and wherein high density tungsten particles or other high density particles are uniformly distributed throughout the pellet P. FIG. 8 illustrates another form of spherical shot pellet 41 containing core material 22' in which the high density metal particles are not uniformly distributed but are concentrated more along one side of the pellet P as illustrated. This results in an off-center center of gravity so as to lend stability to the pellet

> during its flight. Thus, the heavier side of the sphere will lead and the lighter side trail.

It is clear from this that Oltrogge is not forming a shot pellet that has an inner core and an outer shell. This is clear from the description of Oltrogge where the materials are distributed uniformly. In one case, he concentrates some material to one side of the pellet, but even here, the materials are mixed thoroughly and have no distinct inner core and outer covering. This is further shown by comparing figure 2 of the instant application to figure 7 of Oltrogge. Oltrogge's figure 7 shows uniform distribution of materials in the pellet, and no separate outer shell.

For these reasons, applicants believe that Oltrogge neither anticipates, nor is the instant invention made obvious in light of Oltrogge. Accordingly, applicant believes that these rejections have been traversed.

Regarding the rejection of claims 1 and 4 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hooper et al. (US Patent # 4,881,465), applicants note that claim 4 has been canceled. Accordingly, that rejection is moot. As to claims 1, applicants note that Hooper also teaches a blended set of alloys that do not have a distinct core and distinct outer shell. As described in the Hooper abstract:

> A non-toxic shotgun pellet having ballistic characteristics similar to those of lead shot is made up of *particles of a first alloy, containing primarily*

ferrotungsten, suspended in a matrix of a second alloy, containing primarily lead. The relative amounts of lead and ferrotungsten are selected to minimize cost while keeping the overall lead content to forty percent or less, by weight, to avoid toxicity. The first alloy is formed by diluting the ferrotungsten with iron or steel and carbon at temperatures on the order of 1800 degrees C in an inert gas environment. The alloy is quenched and then crushed into particles over which is poured the second alloy comprising lead, tin and antimony in order to suspend the first alloy particles in the second alloy mixture. (Emphasis added)

Hooper describes the pellets making process as follows:

In accordance with the present invention a first alloy of iron, ferrotungsten alloy, and carbon is crushed into small particles *and suspended in a matrix of a second alloy of lead, tin and antimony.* The resulting material is then made into shot spheres and typically has a specific gravity in the range of 9.5 to 11.5 g/cc. *Except for lead and antimony, none of the other elements employed in the final material are considered toxic.* The percentage of lead, by weight, in the pellets thusly formed is in the range of fifteen to forty percent, preferably in the more limited range of twenty to thirty-five percent, substantially below toxicity levels. The preferred range of antimony content by weight is 0.02 to seven percent, also far below toxicity levels. As a consequence, spent shot pellets made of this material present no toxicity hazard to feeding waterfowl. (Hooper, col. 3, lines 48-63). (Emphasis added).

Hooper describes the process in more detail:

The lead-tin-antimony alloy, in molten form, is poured over pre-measured iron-ferrotungsten-carbon alloy particles which are wetted by the molten alloy and become *suspended* in a matrix of that alloy. Conventional fluxes may be employed to accelerate and assure complete wetting. *The resulting suspension* can be treated in a manner quite similar to that in which conventional lead shot pellets are formed. In this manner

the material can be inexpensively formed into spheres of appropriate diameter for the different shot sizes. (Hooper col. 5, lines 28-37). (Emphasis added).

It is clear that from the above description, Hooper fails as a reference for the amended claims in two ways. First, it lists lead as an ingredient. Although the level of lead is reduced to keep the shot non-toxic, it is a toxic material. Second, as highlighted above, the Hooper shot pellets are a suspension of materials in a liquid matrix of other materials that is hardened into a pellet. There is noting in Hooper that teaches or suggests the idea of a non-toxic shot pellet with a distinct core and a distinct outer shell. Hooper makes these pellets by melting two alloys and then mixing them together into one homogonous material. This is clearly not what is claimed in the instant application. The shot pellets produced in the instant application are not a blend of materials but have distinct parts to them.

Accordingly, applicants believe that these rejections have also been traversed.

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Conclusion

In view of the above, the applicant believes that all of the objections and rejections have been resolved. Reexamination and reconsideration of the claims is requested soon.

Respectfully Submitted

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In the Drawings

Applicants have attached a proposed figure 2 to illustrate a cross-section of a shot pellet according to the instant invention and as per the request of the examiner.